

TEST REPORT For FCC

Test Report No. : 2008030005
Date of Issue : March 10, 2008
FCC ID : V4NUC193
Model/Type No. : UC193
Classification : PCS licensed transmitter(PCB)
Applicant : YISO Wireless Co., Ltd.
Applicant Address : Suite 407,Gold, 217 Yangjiae-dong,Seocho-gu,Seoul,Korea
Manufacturer : YISO Wireless Co., Ltd.
Manufacturer Address : Suite 407,Gold, 217 Yangjiae-dong,Seocho-gu,Seoul,Korea
Contact Person : Mr. Shin Tae Hun
Telephone : +82-70-7019-8520
Received Date : February 5, 2008
Test period : Start : February 18, 2008 End : March 10, 2008
Test Results : ☒ In Compliance ☐ Not in Compliance

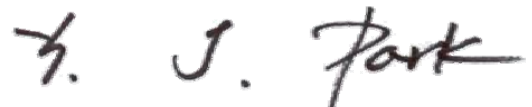
The test results presented in this report relate only to the object tested.

Tested by



Kyu-Chul, Shin
Test Engineer
Date: March 10, 2008

Reviewed by



Young-Joon, Park
Technical Manager
Date: March 10, 2008



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REPORT REVISION HISTORY

Date	Revision	Page No
March 10, 2008	Issued (2008030005)	All

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TEST REPORT

1. 1 Scope

Measurement and determination of electromagnetic emissions (EME) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission.

2.1 General Information

Classification	: PCS licensed transmitter(PCB)
EUT Type	: CDMA 1x RTT/1XEV-DO (PCS Single Band USB Modem)
FCC Rule Part(s)	: §24(E) §2
Model name	: UC193
Serial number	: Identical prototype
Emission Designators:	: 1M27F9W
Tx Freq. Range	: 1851.25 ~ 1908.75 MHz (PCS CDMA)
Rx Freq. Range	: 1931.25 ~ 1908.75 MHz (PCS CDMA)
Modulation(s):	: PCS CDMA
Frequency Tolerance:	: ± 0.00025 % (2.5ppm)
Maximum Output Power	: 24.68dBm for 1xRTT 23.38dBm for 1XEV-DO
Maximum EIRP	: 25.89dBm for 1xRTT 24.43dBm for 1XEV-DO
Power Source	: USB 5 Vdc



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3.1 DESCRIPTION OF TESTS

3.1.1 Occupied Bandwidth Emission Limits

- (a) On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least $43 + 10 \log(P)$ dB.
- (b) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the licensee's frequency block edges, both upper and lower, as the design permits.
- (c) The measurement of emission power can be expressed in peak or average values, provided they are expressed in the same parameters as the transmitter power.

3.1.2 Occupied Bandwidth

The 99% power bandwidth was measured with a calibrated spectrum analyzer.

3.1.3 Spurious and Harmonic Emissions at Antenna Terminal

The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to 20 GHz.

3.1.4 Frequencies

At the input terminals of the spectrum analyzer, an isolator (RF pad) and a high-pass filter are connected between the test transceiver (for conducted tests) or the receive antenna (for radiated tests) and the analyzer. The high-pass filter is to limit the fundamental frequency from interfering with the measurement of low-level spurious and harmonic emissions and to ensure that the preamplifier is not saturated.

3.1.5 Radiation Spurious and Harmonic Emissions

Radiation and harmonic emissions are measured outdoors at our 3-meter test range. The equipment under test is placed on a wooden turntable 3-meters from the receive antenna.

The receive antenna height and turntable rotations were adjusted for the highest reading on the receive spectrum analyzer. A half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator with the level of the signal generator being adjusted to obtain the same receive spectrum analyzer reading. This level is recorded. For readings above 1GHz, the above procedure is repeated using horn antennas and the difference between the gain of the horn and an isotropic or dipole antenna are taken into consideration.

3.1.6 Frequency Stability/Temperature Variation.

The frequency stability of the transmitter is measured by:

- a) **Temperature** :The temperature is varied from -30°C to + 60°C using an environmental chamber.
- b) **Primary Supply Voltage** :The primary supply voltage is varied from 85% to 115% of the voltage Normally at the input to the device or at the power supply terminals if cables are not normally supplied.

Specification –The minimum frequency stability shall be +/- 0.00025% at any time during normal operation.

Specification — The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability of the transmitter shall be maintained within $\pm 0.00025(\pm 2.5\text{ppm})$ of the center frequency.



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Time Period and Procedure:

1. The carrier frequency of the transmitter and the individual oscillators is measured at room temperature (25°C to 27 °C to provide a reference)
2. The equipment is subjected to an overnight "soak" at -30°C without any power applied.
3. After the overnight "soak" at -30°C(usually 14-16 hours),the equipment is turned on in a "standby" condition for one minute before applying power to the transmitter. Measurement of the carrier frequency to the transmitter and the individual oscillators is made within a three minute interval after applying power to the transmitter.
4. Frequency measurements is made at 10°C interval up to room temperature. At least a period of one and one half hour is provided to allow stabilization of the equipment at each temperature level.
5. Again the transmitter carrier frequency and the individual oscillators is measured at room temperature to begin measurement of the upper temperature levels.
6. Frequency were made at 10 intervals starting at -30°C up to +50°C allowing at least two hours at each temperature for stabilization. In all measurements the frequency is measured within three minutes after applying power to the transmitter.
7. The artificial load is mounted external to the temperature chamber.

3.1.7 Radiated Emission

Final test was performed according to ANSI C63.4-2003 at the open field test site. There are no deviations from the standard.

The EUT was placed in a 0.8m high table along with the peripherals. The turn table was separated from the antenna distance 3meters. Cables were placed in a position to produce maximum emissions as determined by experimentation, and operation mode was selected for maximum.

The frequencies and amplitudes of maximum emission were measured at varying azimuths, antenna heights and antenna polarities. Reported are maximized emission levels.

These tests were performed at 120kHz of 6dB bandwidth.



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3.1.8 Conducted Emission

The power line conducted interference measurements were performed according to ANSI C63.4-2003 in a shielded enclosure with peripherals placed on a table, 0.8m high over a metal floor. It was located more than required distance away from the shielded enclosure wall. There are no deviations from the standard.

The EUT was plugged into the LISN and the frequency range of interest scanned.

Reported are maximized emission levels.

These tests were performed at 9kHz of 6dB bandwidth.



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4.1 TEST DATA

4.1.1 Conducted Output Power

The output power was measured under all R.C.s and S.O.s which are listed below measurement data.

The worst case output power is reported with SO55 of RC3 for PCS band. Therefore this device was tested under SO55 of RC3 for PCS band.

SAR Measurement Procedures for 3G Devices(Released June 2006)

- verify maximum output power
 - on high, middle and low channels
 - according to 3GPP2 C.S0011 / TIA-98-E, Sec. 4.4.5
- Power measurement configurations

1. 1X RRT

- Test Mode 1(C.S0011 Table 4.4.5.2-1), SO55, RC1, Traffic Channel @9600bps
- Test Mode 3(C.S0011 Table 4.4.5.2-2), SO55, RC3, FCH @9600bps
- Test Mode 3(C.S0011 Table 4.4.5.2-2), SO32, RC3, FCH+SCH @9600bps
- other configurations supported by the DUT
- power control
 - Bits Hold for FCH+SCH
 - otherwise ALL Bits Up

2. Ev-DO Rev.0

- EVDO-UL : 9.6Kbps
- EVDO-UL : 38.4Kbps
- EVDO-UL : 153.6Kbps

- Measurement data

Band	Channel	1xRTT					1xEV-DO		
		RC1	RC1	RC3	RC3	RC3	9.6 Kbps	38.4 Kbps	153.6 Kbps
		SO2	SO55	SO2	SO55	TDSO			
PCS	25	24.51	24.52	24.62	24.68	24.54	23.12	22.04	21.84
	600	24.65	24.54	24.60	24.67	24.62	23.38	22.13	22.21
	1175	24.12	23.91	24.02	24.17	24.05	22.48	21.50	21.43



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4.1.2 Equivalent Isotropic Radiated Power(E.I.R.P.)PCS CDMA

- Modulation: PCS CDMA(1xRTT)

Freq. Tuned (MHz)	REF. LEVEL (dBm)	POL (H/V)	EIRP (dBm)	EIRP (W)	Supplied Power	Note
1851.25	-12.35	V	25.89	0.388	DC 5V	RC3 SO55
1880.00	-12.55	V	25.84	0.384	DC 5V	RC3 SO55
1908.75	-12.85	V	25.48	0.353	DC 5V	RC3 SO55

- Modulation: PCS CDMA(1xEV-DO)

Freq. Tuned (MHz)	REF. LEVEL (dBm)	POL (H/V)	EIRP (dBm)	EIRP (W)	Supplied Power	Note
1851.25	-14.14	V	24.09	0.256	DC 5V	9Kbps
1880.00	-14.18	V	24.21	0.263	DC 5V	9Kbps
1908.75	-13.90	V	24.43	0.277	DC 5V	9Kbps

NOTES:

Equivalent Isotropic Radiated Power Output Measurements by Substitution Method according to ANSI/TIA/EIA-603-C-2004, Aug. 17, 2004:

The EUT was placed on a wooden table 3-meters from the receive antenna. The receive antenna height and turntable rotation was adjusted for the highest reading on the receive spectrum analyzer.

A Horn antenna was substituted in place of the EUT. This Horn antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same receive spectrum analyzer reading. The conducted power at the terminals of the Horn antenna is measured. The EIRP is recorded.

4.1.3 PCS CDMA Radiated Measurements

(Continued...)

Field Strength of SPURIOUS Radiation

OPERATING FREQUENCY : 1851.25 MHz
CHANNEL : 25(Low)
MEASURED OUTPUT POWER : 25.89 dBm = 0.388 W
MODULATION SIGNAL : PCS CDMA (Internal)
DISTANCE : 3 meters
LIMIT : $43 + 10 \log_{10} (W) = \underline{\quad 38.89 \quad}$ dBc

Remarks

We have tested two mode (1xRTT/1xEV-DO).
The worst mode (1xRTT(S055, RC3)) for final test.

Freq. (MHz)	LEVEL@ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBd)	CORRECT GENERATOR LEVEL (dBm)	POL (H/V)	(dBc)
3702.20	-32.64	9.76	-22.88	V	-48.77
-	-	-	-	-	-

- No other emissions were detected at a level greater than 20dB below limit.

NOTES:

Radiated Spurious Emission Measurements by Substitution Method
according to ANSI/TIA/EIA-603-C-2004, Aug. 17, 2004:

The EUT was placed on a wooden turn table 3-meters from the receive antenna. The receive antenna height and turntable rotation was adjusted for the highest reading on the receive spectrum analyzer. A half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same receive spectrum analyzer reading. This spurious level is recorded. For readings above 1GHz, the above procedure is repeated using horn antennas and the difference between the gain of the horn and an isotropic or dipole antenna are taken into consideration.



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4.1.3 PCS CDMA Radiated Measurements

(Continued...)

Field Strength of SPURIOUS Radiation

OPERATING FREQUENCY : 1880.00 MHz
CHANNEL : 600(Mid)
MEASURED OUTPUT POWER : 25.84 dBm = 0.384 W
MODULATION SIGNAL : PCS CDMA (Internal)
DISTANCE : 3 meters
LIMIT : $43 + 10 \log_{10} (W) = 38.84$ dBc

- 1xRTT(SO55, RC3)

Freq. (MHz)	LEVEL@ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBd)	CORRECT GENERATOR LEVEL (dBm)	POL (H/V)	(dBc)
3760.25	-32.51	9.76	-22.75	V	-48.59
-	-	-	-	-	-

- No other emissions were detected at a level greater than 20dB below limit.

NOTES:

Radiated Spurious Emission Measurements by Substitution Method according to ANSI/TIA/EIA-603-C-2004, Aug. 17, 2004:

The EUT was placed on a wooden turn table 3-meters from the receive antenna. The receive antenna height and turntable rotation was adjusted for the highest reading on the receive spectrum analyzer. A half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same receive spectrum analyzer reading. This spurious level is recorded. For readings above 1GHz, the above procedure is repeated using horn antennas and the difference between the gain of the horn and an isotropic or dipole antenna are taken into consideration.

4.1.3 PCS CDMA Radiated Measurements (Continued...)

Field Strength of SPURIOUS Radiation

OPERATING FREQUENCY : 1908.75 MHz
 CHANNEL : 1175(High)
 MEASURED OUTPUT POWER : 25.48 dBm = 0.353 W
 MODULATION SIGNAL : PCS CDMA (Internal)
 DISTANCE : 3 meters
 LIMIT : $43 + 10 \log_{10} (W) = 38.48$ dBc

- 1xRTT(S055, RC3)

Freq. (MHz)	LEVEL@ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBd)	CORRECT GENERATOR LEVEL (dBm)	POL (H/V)	(dBc)
3817.75	-31.87	9.76	-22.11	V	-47.59
-	-	-	-	-	-

- No other emissions were detected at a level greater than 20dB below limit.

NOTES:

Radiated Spurious Emission Measurements by Substitution Method according to ANSI/TIA/EIA-603-C-2004, Aug. 17, 2004:

The EUT was placed on a wooden turn table 3-meters from the receive antenna. The receive antenna height and turntable rotation was adjusted for the highest reading on the receive spectrum analyzer. A half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same receive spectrum analyzer reading. This spurious level is recorded. For readings above 1GHz, the above procedure is repeated using horn antennas and the difference between the gain of the horn and an isotropic or dipole antenna are taken into consideration.



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4.1.4 Frequency Stability (1xRTT)

OPERATING FREQUENCY : 1,880,000,056 Hz
CHANNEL : 600(Mid)
Test Mode : 1xRTT
REFERENCE VOLTAGE : 5 VDC
DEVIATION LIMIT : ± 0.00025 % or 2.5 ppm

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQ (Hz)	Deviation (%)
100%	5	+25(Ref)	1,880,000,056	0.000000
100%		-30	1,880,000,042	0.000001
100%		-20	1,880,000,032	0.000001
100%		-10	1,880,000,022	0.000002
100%		0	1,879,999,970	0.000005
100%		+10	1,879,999,932	0.000007
100%		+20	1,880,000,009	0.000003
100%		+25	1,880,000,062	0.000003
100%		+30	1,880,000,079	0.000001
100%		+40	1,880,000,018	0.000002
100%		+50	1,880,000,020	0.000002
100%		+60	1,879,999,941	0.000006
85%	4.25	+25	1,880,000,068	0.000006
115%	5.75	+25	1,880,000,078	0.000001
BATT.ENDPOINT	-	+25	-	-



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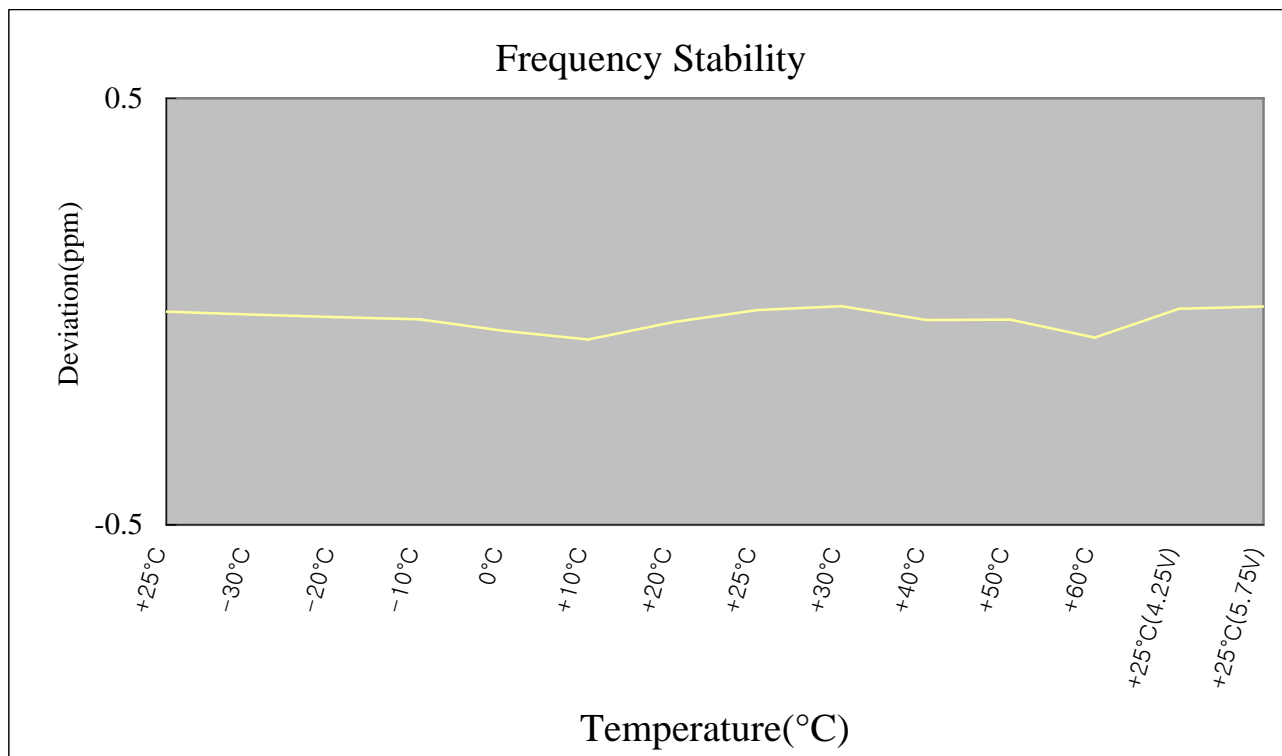
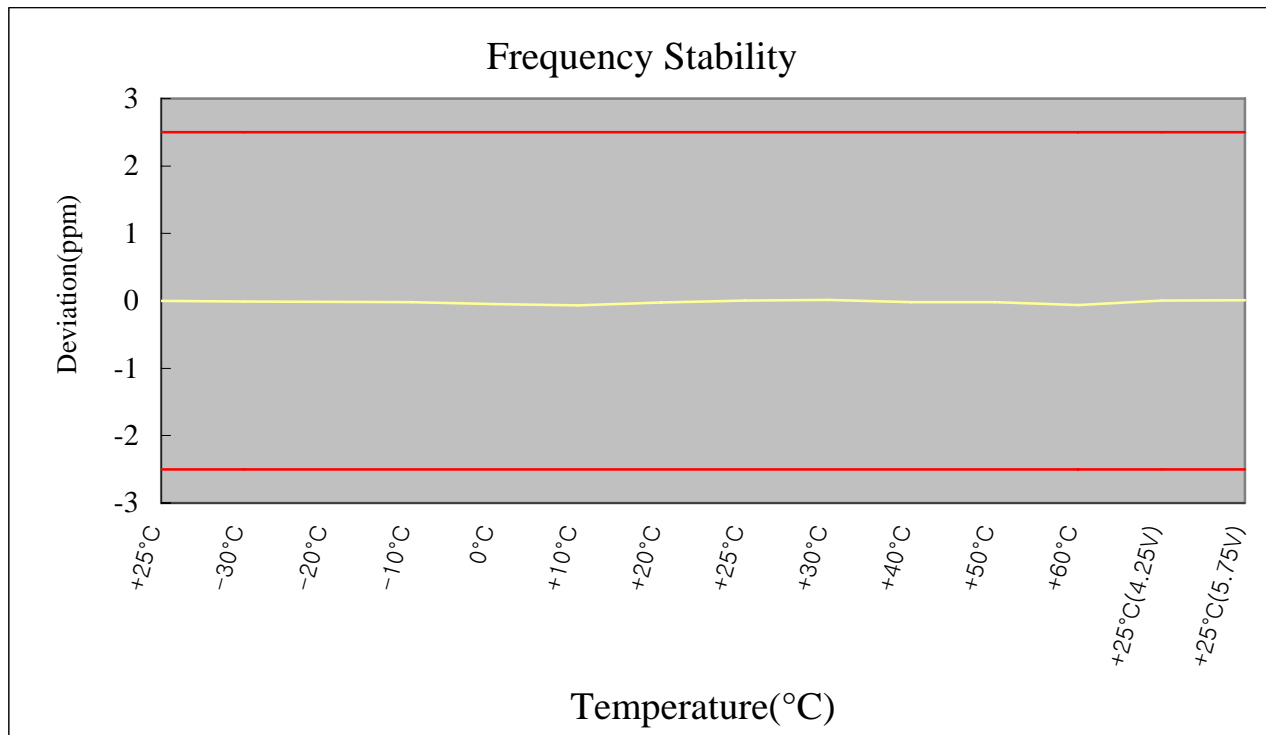
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4.1.4 Frequency Stability (1xRTT)

(Continued...)





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4.1.4 Frequency Stability (1xEV-DO)

OPERATING FREQUENCY : 1,879,999,999 Hz
CHANNEL : 600(Mid)
Test Mode : 1xEV-DO
REFERENCE VOLTAGE : 5 VDC
DEVIATION LIMIT : ± 0.00025 % or 2.5 ppm

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQ (Hz)	Deviation (%)
100%	5	+25(Ref)	1,879,999,999	0.000000
100%		-30	1,880,000,004	0.000000
100%		-20	1,879,999,995	0.000000
100%		-10	1,880,000,002	0.000000
100%		0	1,880,000,003	0.000000
100%		+10	1,880,000,003	0.000000
100%		+20	1,880,000,010	0.000001
100%		+25	1,879,999,997	0.000000
100%		+30	1,880,000,002	0.000000
100%		+40	1,880,000,001	0.000000
100%		+50	1,880,000,004	0.000000
100%		+60	1,880,000,008	0.000001
85%	4.25	+25	1,879.999,988	0.000001
115%	5.75	+25	1,880,000,002	0.000000
BATT.ENDPOINT	-	+25	-	-



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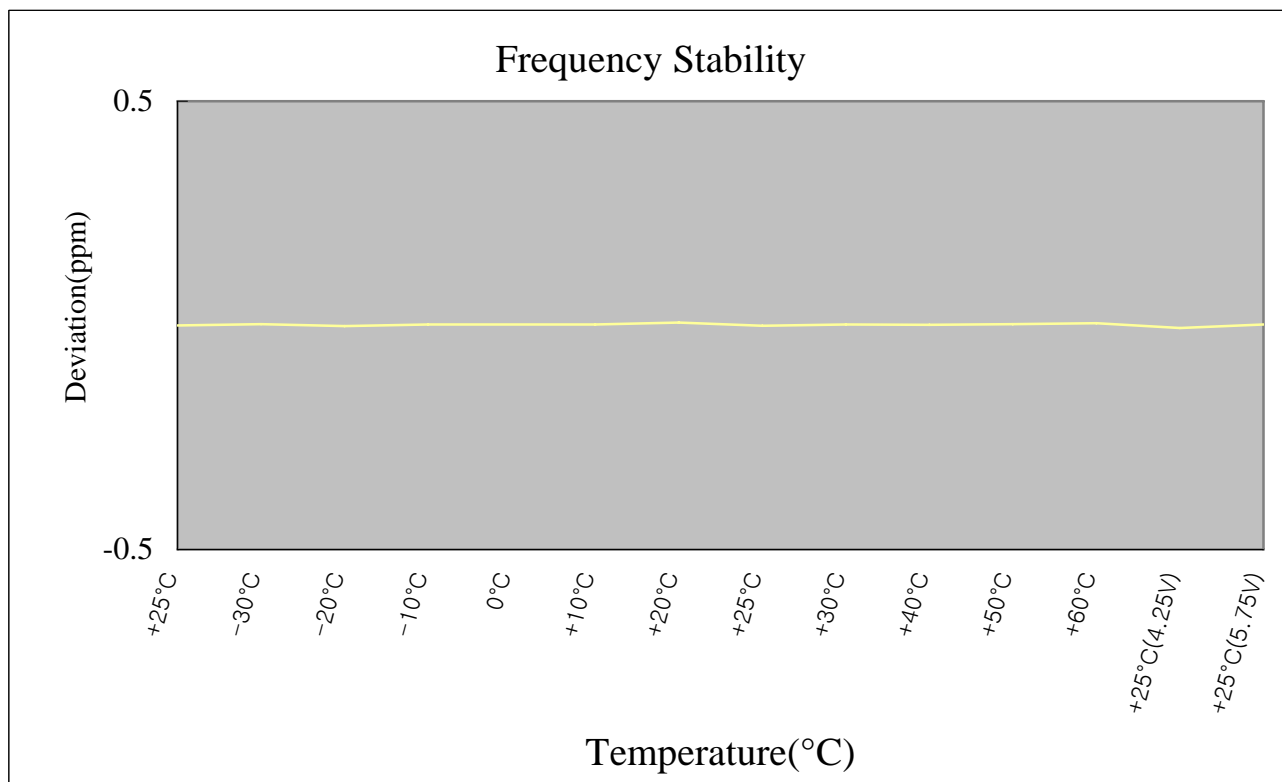
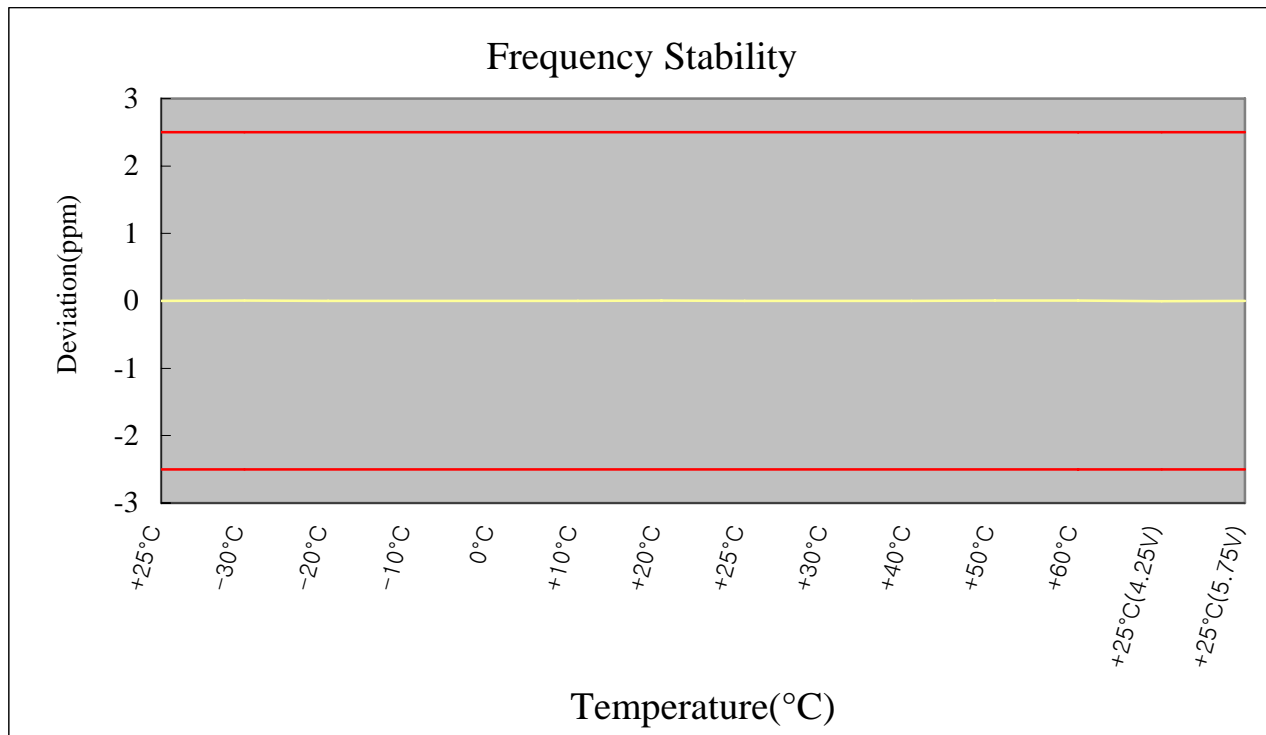
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4.1.4 Frequency Stability (1xEV-DO)

(Continued...)





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5.1 PLOTS OF EMISSIONS

(SEE ATTACHMENT "Test Plots")



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6.1 LIST OF TEST EQUIPMENT

	Name of Equipment	Manufacturer	Model No.	Serial No.	Due Date
1	Spectrum Analyzer	Agilent	8564E	3551A0041	2008-11-01
2	Spectrum Analyzer	HP	E4403B	US39440619	2008-09-03
3	Spectrum Analyzer	Rohde & Schwarz	FSP-30	100994	2008-11-19
4	EMI Test Receiver	Rohde & Schwarz	ESVS30	826638/008	2008-05-30
5	ULTRA Broadband Antenna	Rohde & Schwarz	HL562	361324/014	2008-06-12
6	LOOP ANTENNA	EMCO	6502	9107-2652	2008-10-17
7	LOOP ANTENNA	EMCO	6502	9607-3020	2009-03-06
8	System Power Supply	HP	6032A	3440A-10521	2008-07-16
9	EPM Series Power Meter	HP	E4418A	GB38272734	2008-11-03
10	Power Sensor	HP	8481A	331BA92056	2008-11-03
11	Power Sensor	HP	8482B	331BA05406	2008-11-03
12	Audio Analyzer	HP	8903B	2747A03432	2008-11-01
13	ESG-D Series Signal Generator	Agilent	E4432B	US40054094	2008-11-01
14	SYNTHESIZED SWEEPER	HP	8341B	2819A01563	2008-11-22
15	Modulation Analyzer	HP	8901B	3438A05228	2008-11-08
16	Attenuator	HP	8494A	3308A33351	2008-11-06
17	Attenuator	HP	8496A	3308A15142	2008-11-06
18	Temp&Humi Chamber	Kunpoong	KP-1000	2002KP050041	2009-01-21
19	Temp&Humi Chamber	Kunpoong	KP-RC2000	2002KP650042	2009-01-21
20	EMC Analyzer	Agilent	E7403A	MY42000054	2008-10-22
21	Horn Antenna	ETS-Lindgren	3115	00078894	2008-11-29
22	Horn Antenna	ETS-Lindgren	3115	00078895	2008-11-29
23	Horn Antenna	ETS-Lindgren	3116	00062504	2008-11-27
24	Horn Antenna	ETS-Lindgren	3116	00062916	2008-11-27
25	Dipole Antenna	SCHWARZBECK	VHA 9103	VHA91032557	2009-11-27
26	Dipole Antenna	SCHWARZBECK	UHA 9105	UHA91052417	2009-11-27
27	OPT H64 AMPLIFIER	HP	8447F	3113A06814	2009-03-03
28	PREAMPLIFIER	Agilent	8449B	3008A02307	2008-11-05
29	Radio Communication Tester	Rohde & Schwarz	CMU200	106765	2009-02-09
30	Band Reject Filter	Wainwright Instruments	WRCG824	-	2008-04-16
31	Band Reject Filter	Wainwright Instruments	WRCG1750	-	2008-04-13



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7.1 SAMPLE CALCULATIONS

A. Emission Designator

- Cellular Band

Emission Designator = 1M27F9W

PCS CDMA 1xRTT BW = 1.2680 MHz

PCS CDMA 1xEV-DO BW = 1.2680 MHz

F = Frequency Modulation

9 = Composite Digital Info

W = Combination (Audio/Data)

(Measured at the 99% power bandwidth)



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8.1 CONCLUSION

The data collected shows that the Single Band USB Modem(PCS CDMA)
FCC ID: V4MUC193 complies with all the requirements of Parts 2 and 24 of
the FCC rules.



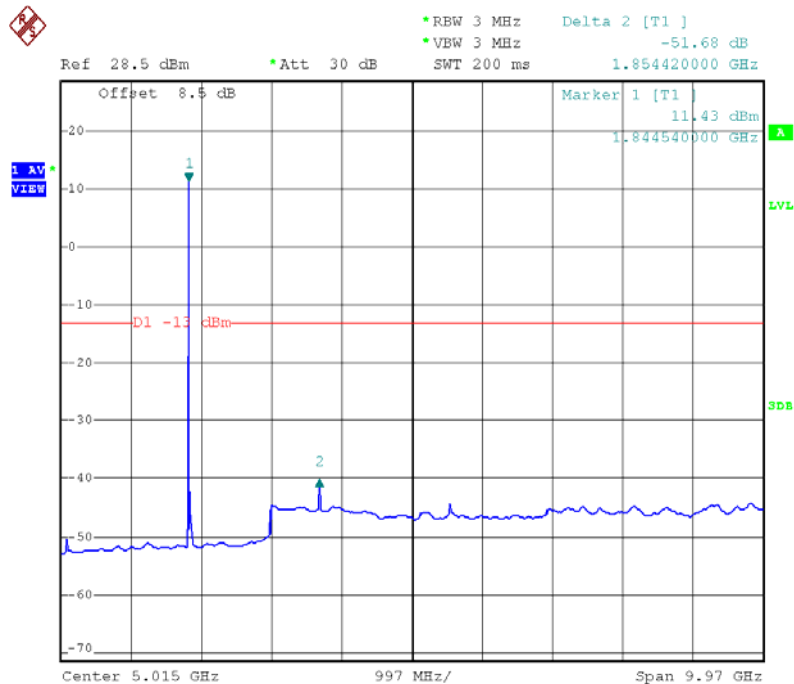
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9.1 TEST PLOTS

- Conducted Spurious US PCS Mode ch.25 for 1xRTT
- Frequency Range : 30M-10G





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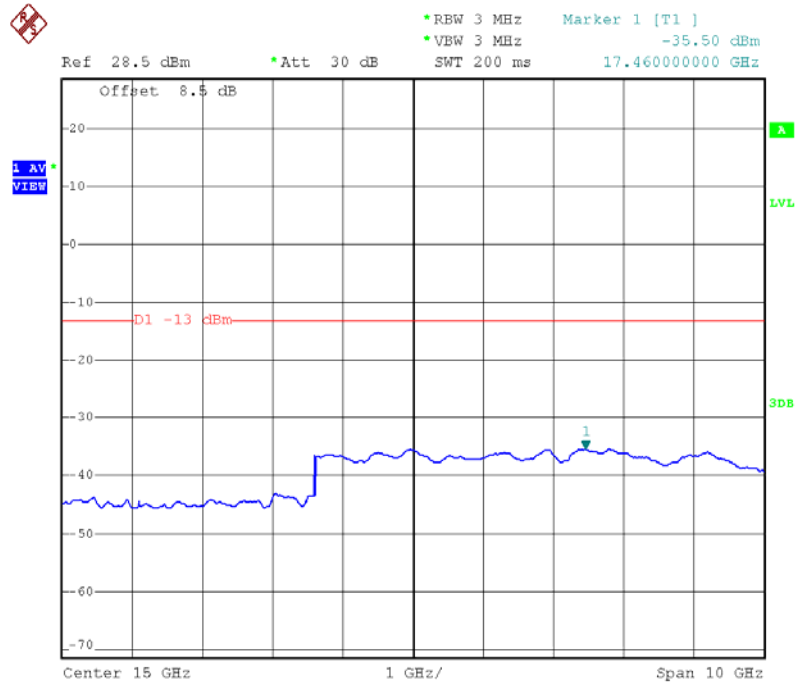
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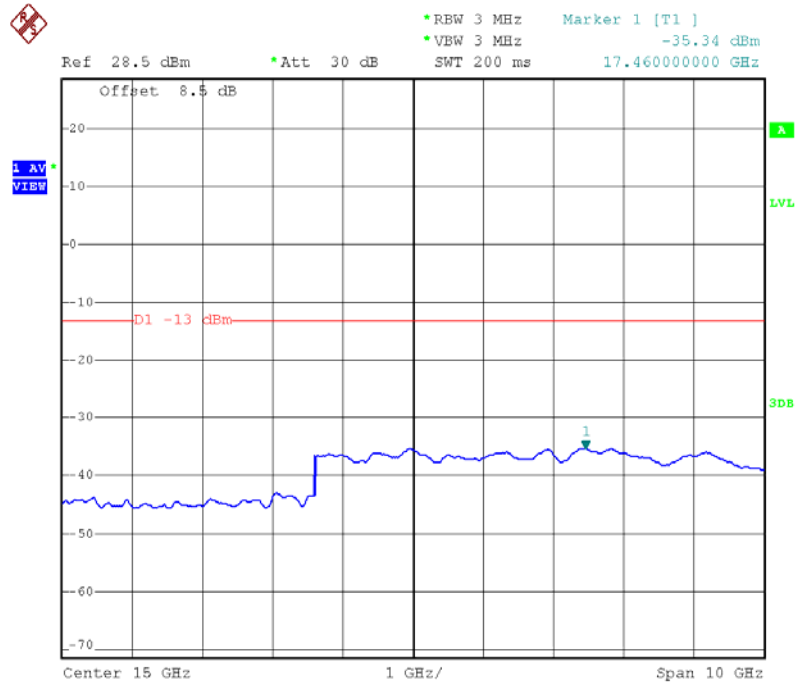


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- Conducted Spurious US PCS Mode ch.600 for 1xRTT - Frequency Range : 10G-20G



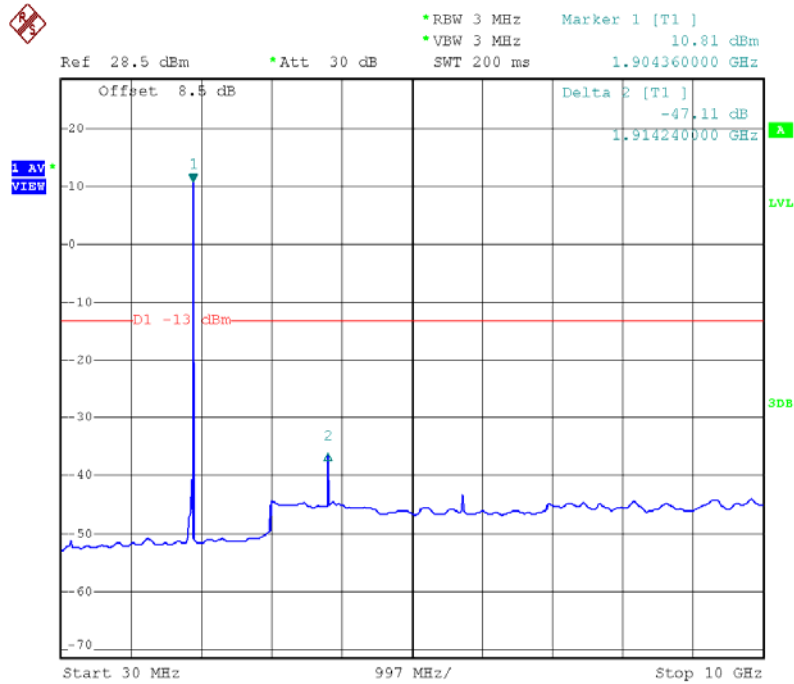


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- Conducted Spurious US PCS Mode ch.1175 for 1xRTT - Frequency Range : 30M-10G





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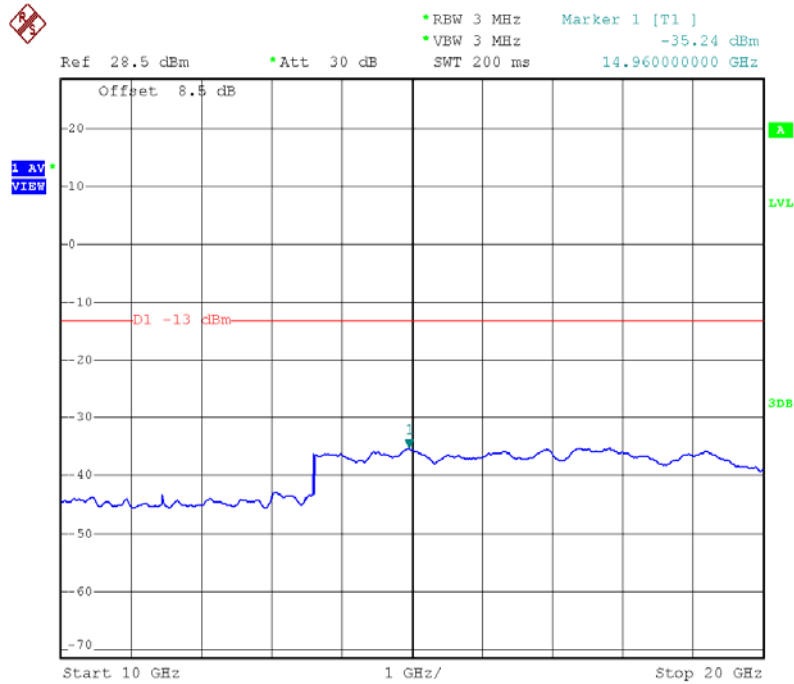
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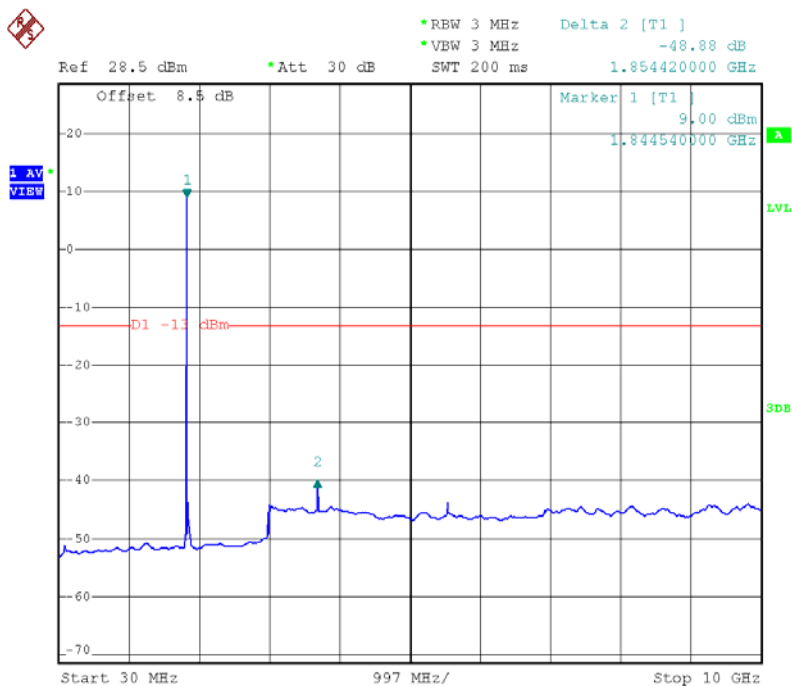
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- Frequency Range : 30M-10G





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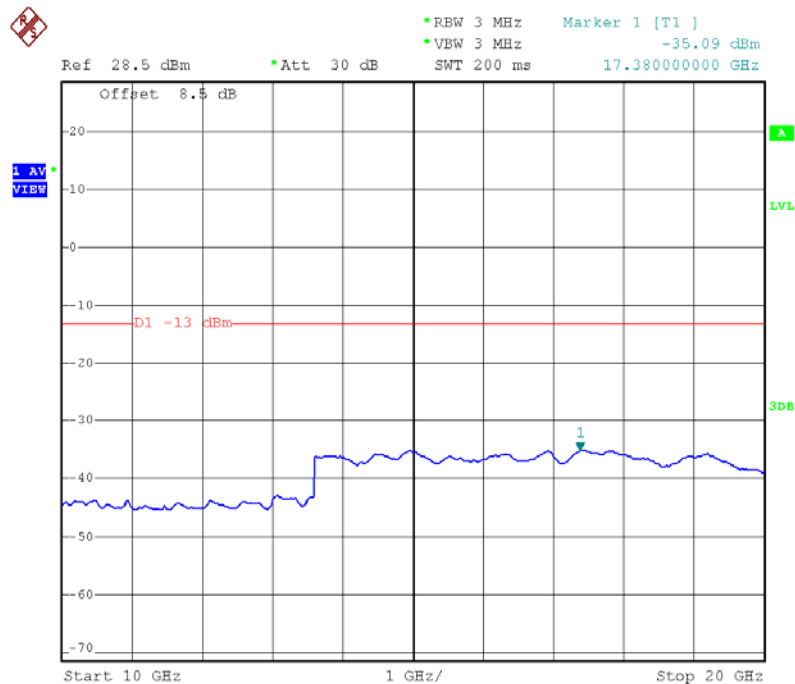
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- Conducted Spurious US PCS Mode ch.25 for 1xEV-DO

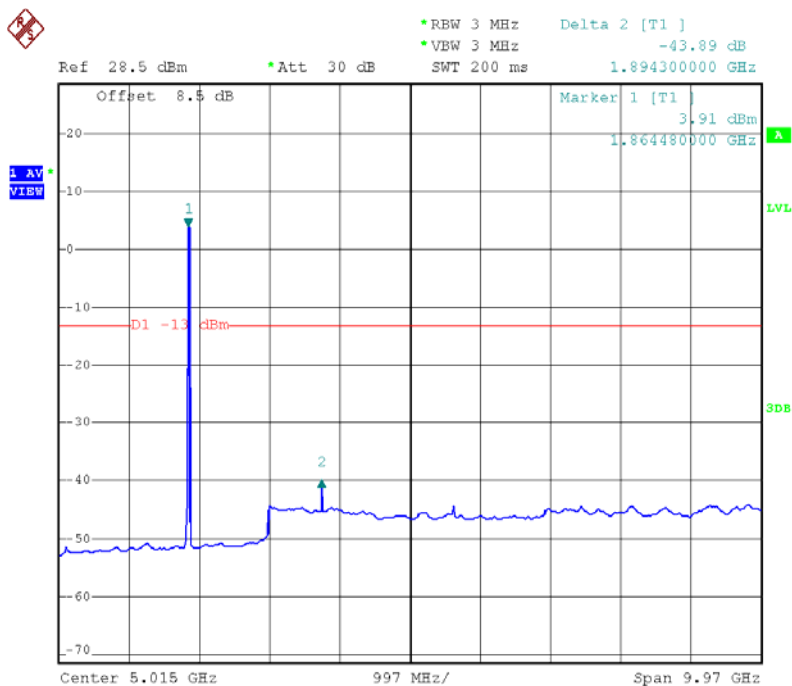
- Frequency Range : 10G-20G





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- Frequency Range : 30M-10G



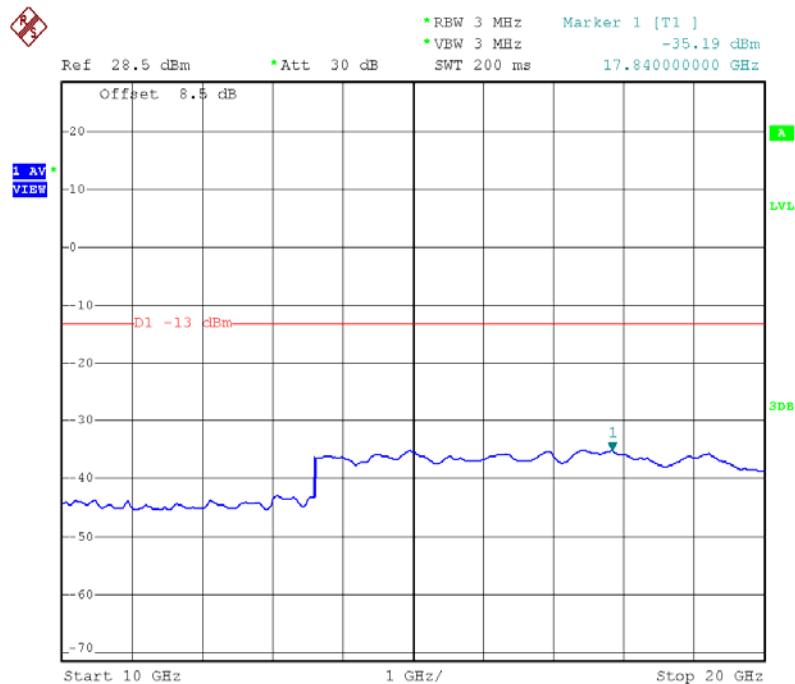


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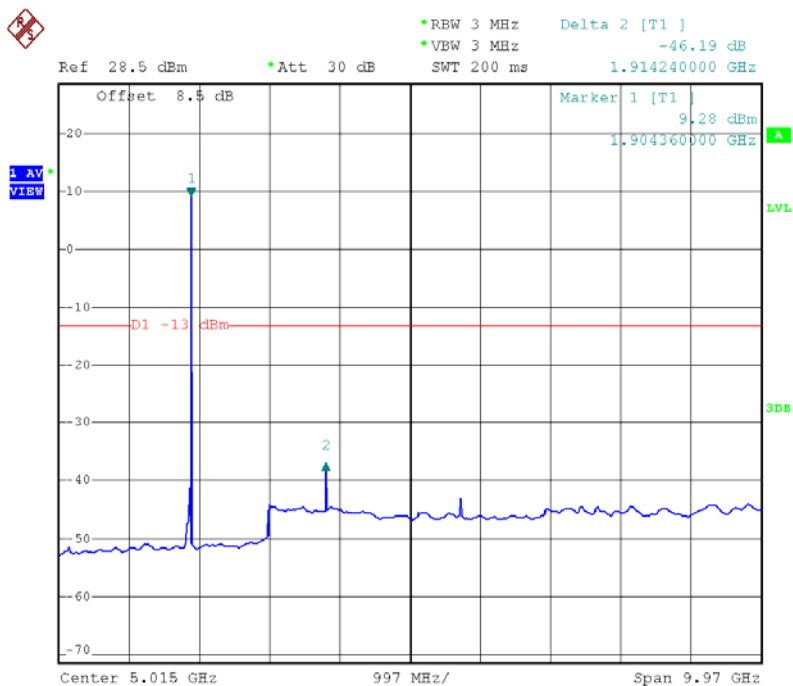
- Conducted Spurious US PCS Mode ch.600 for 1xEV-DO - Frequency Range : 10G-20G





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- Frequency Range : 30M-10G



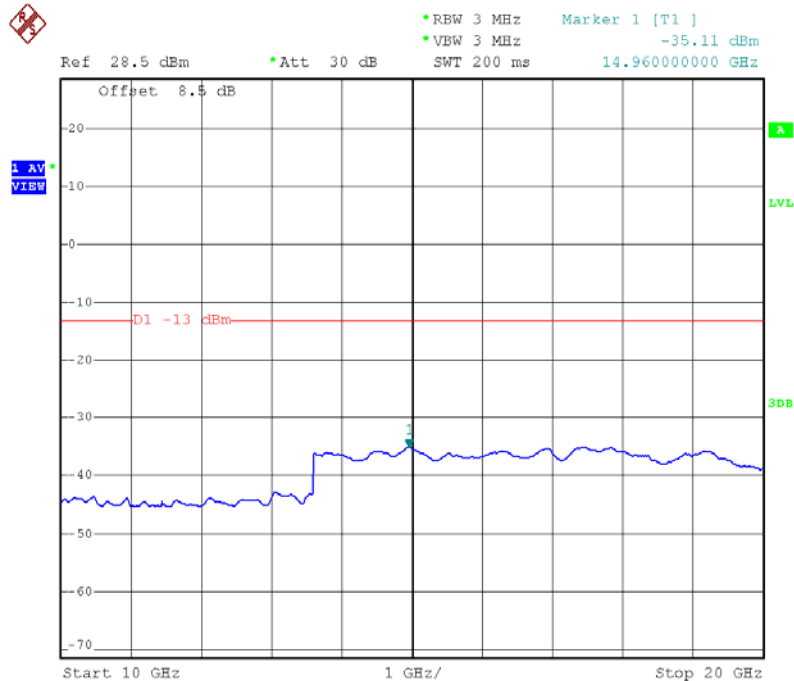


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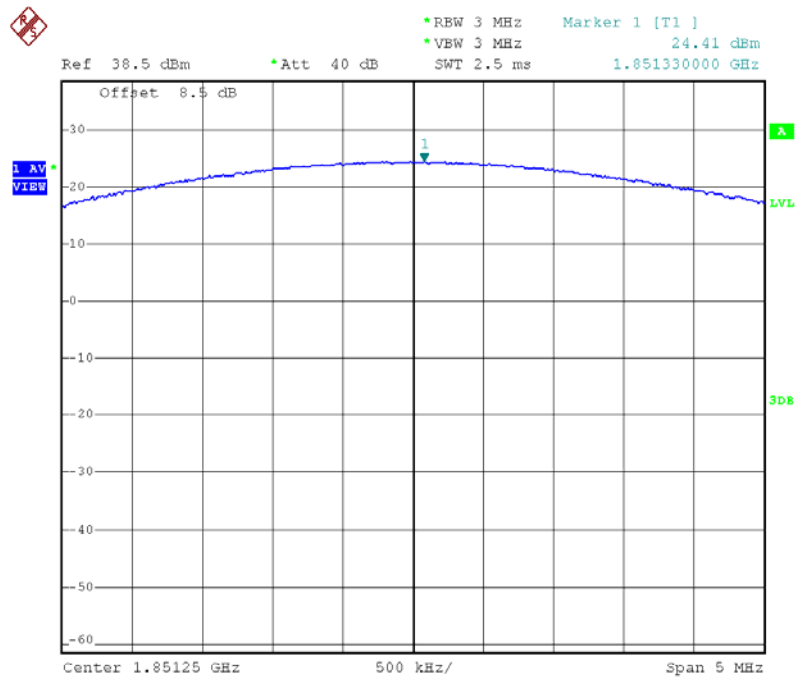


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- Power Out US PCS Mode ch.25 for 1xRTT



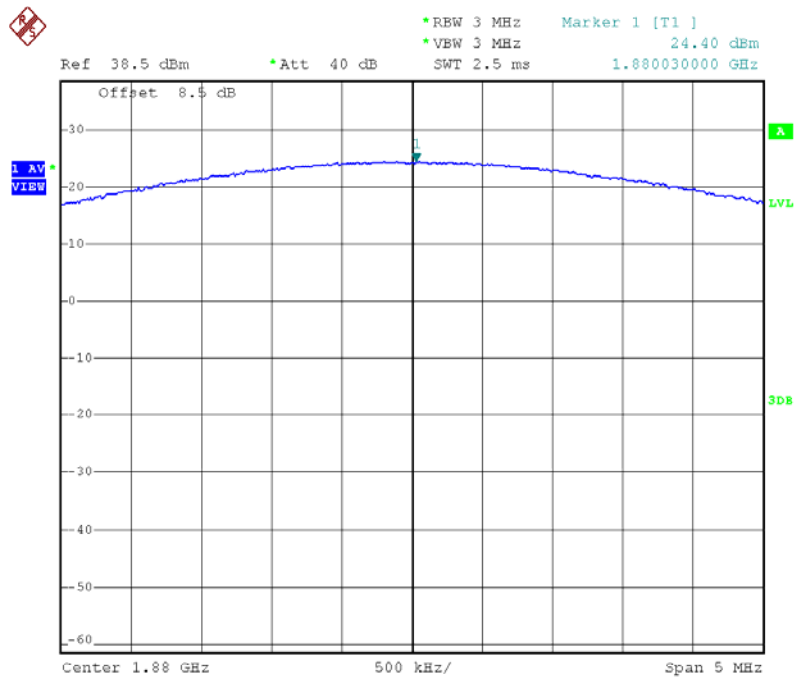


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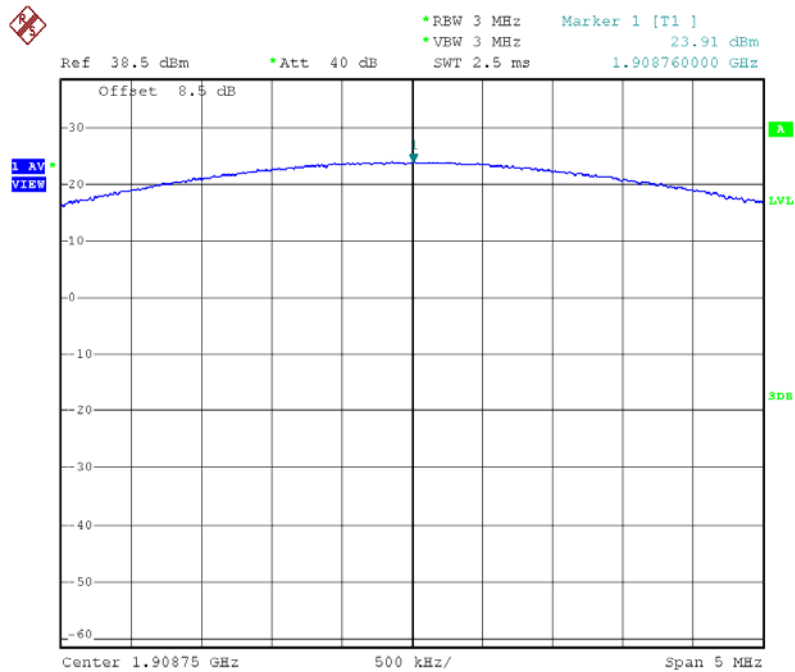


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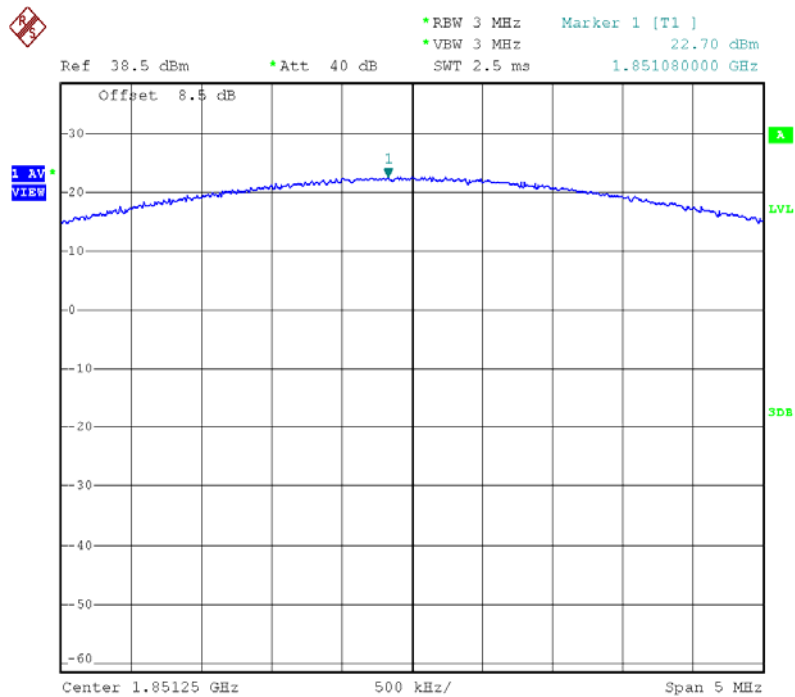


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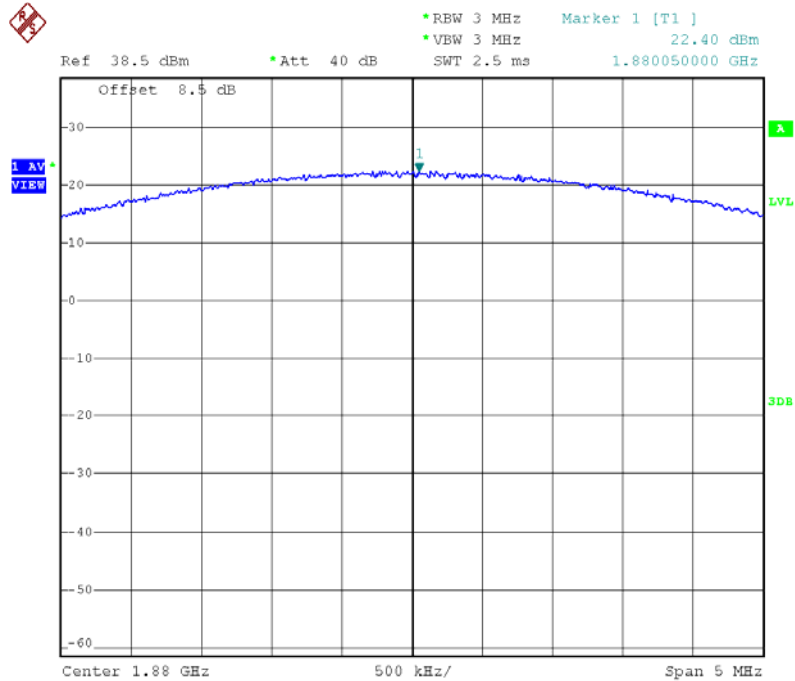


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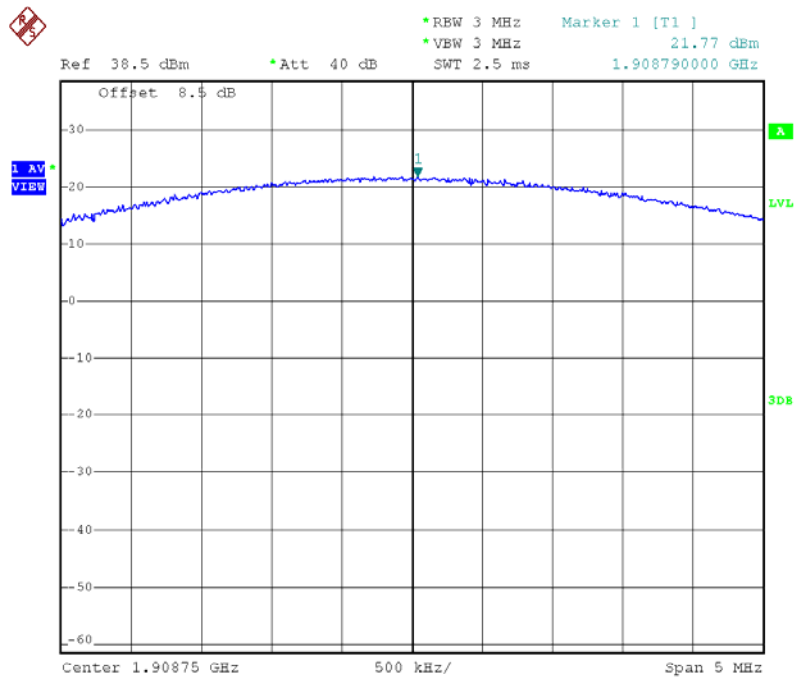


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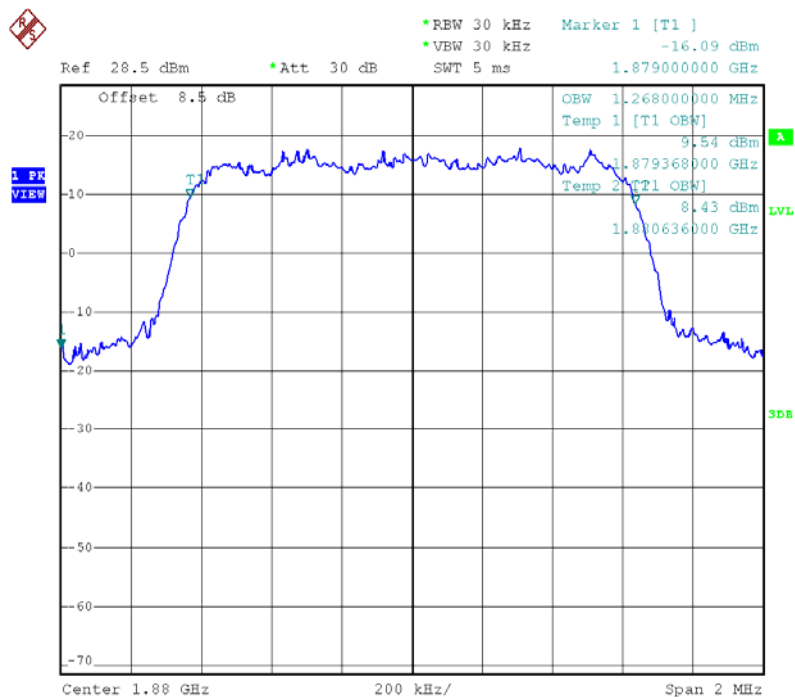
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- Occupied Bandwidth US PCS Mode ch.600 for 1xRTT





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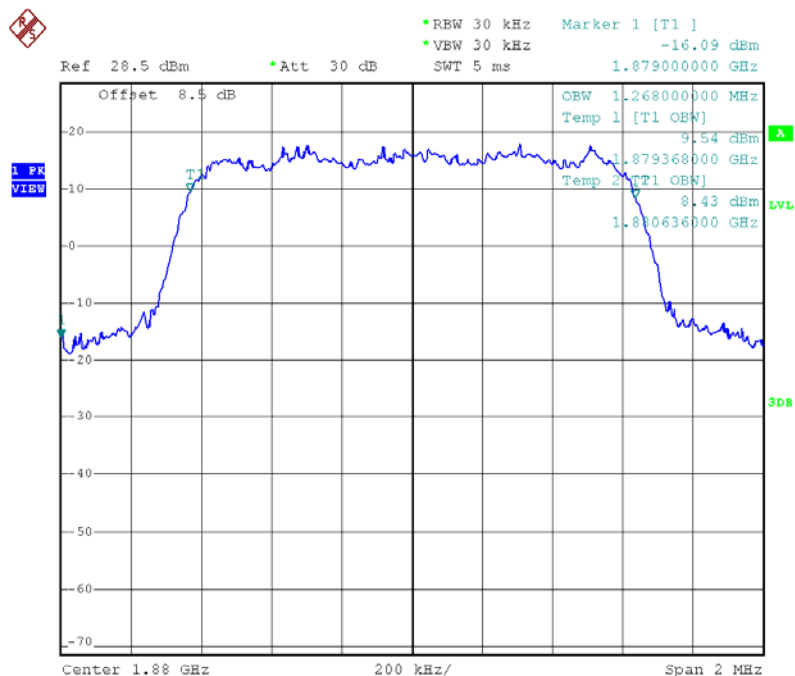
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- Occupied Bandwidth US PCS Mode ch.600 for 1xEV-DO





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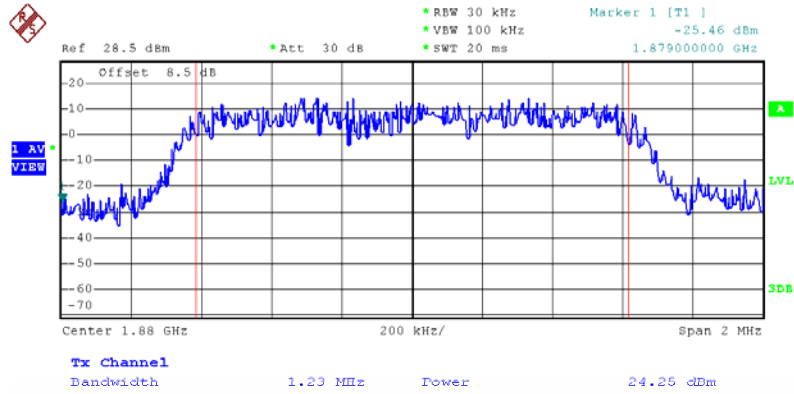
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- Channel Power US PCS Mode ch.600 for 1xRTT



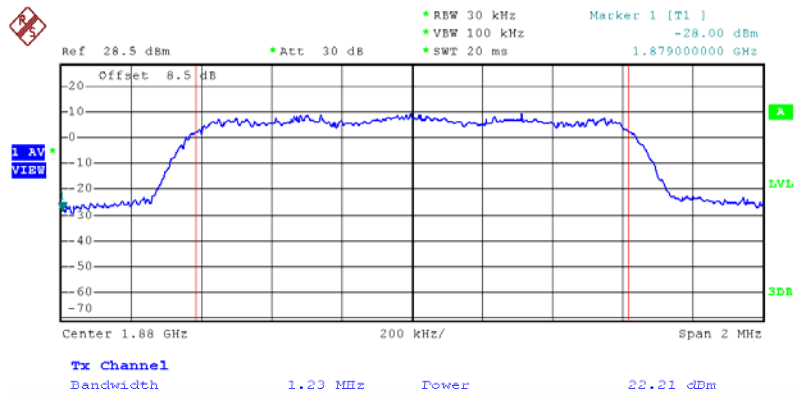


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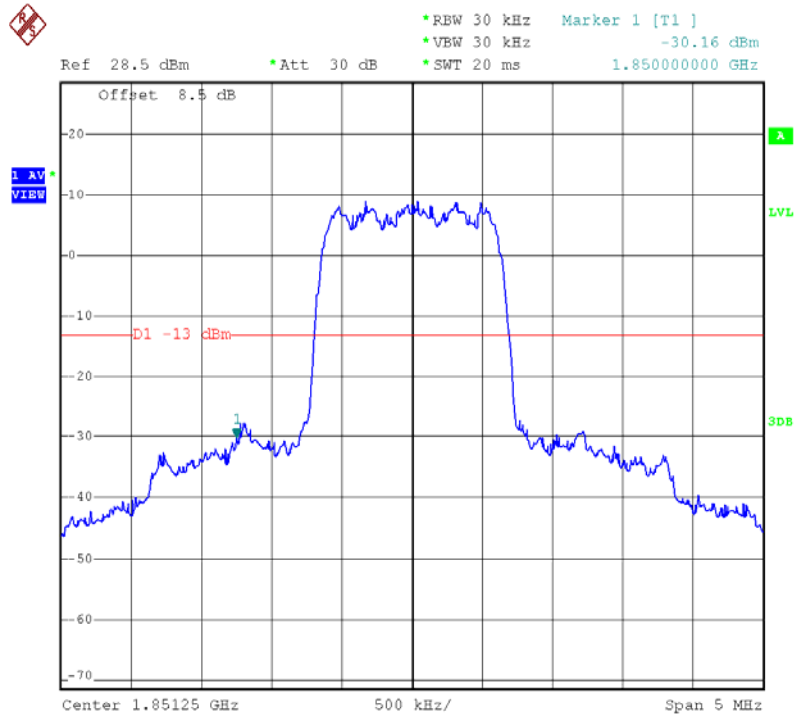


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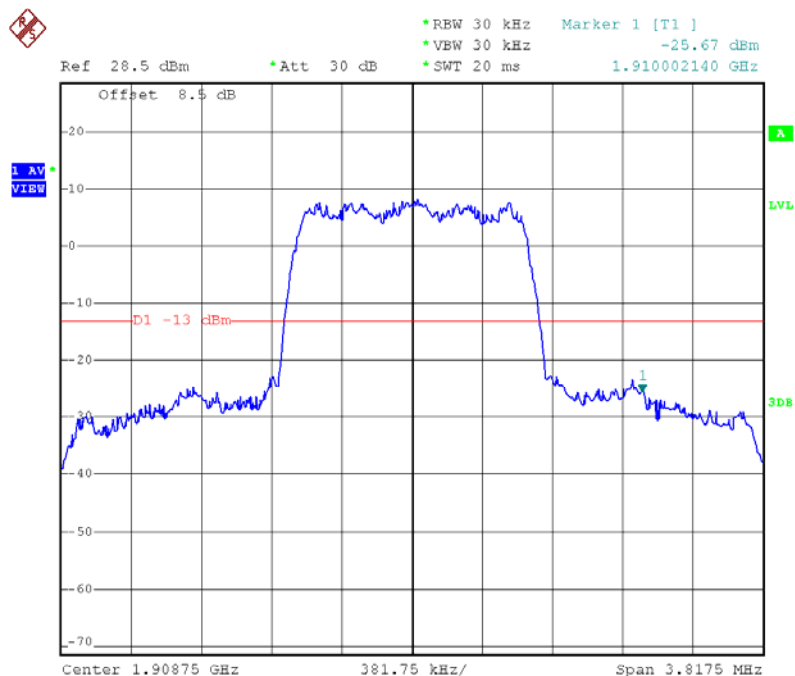
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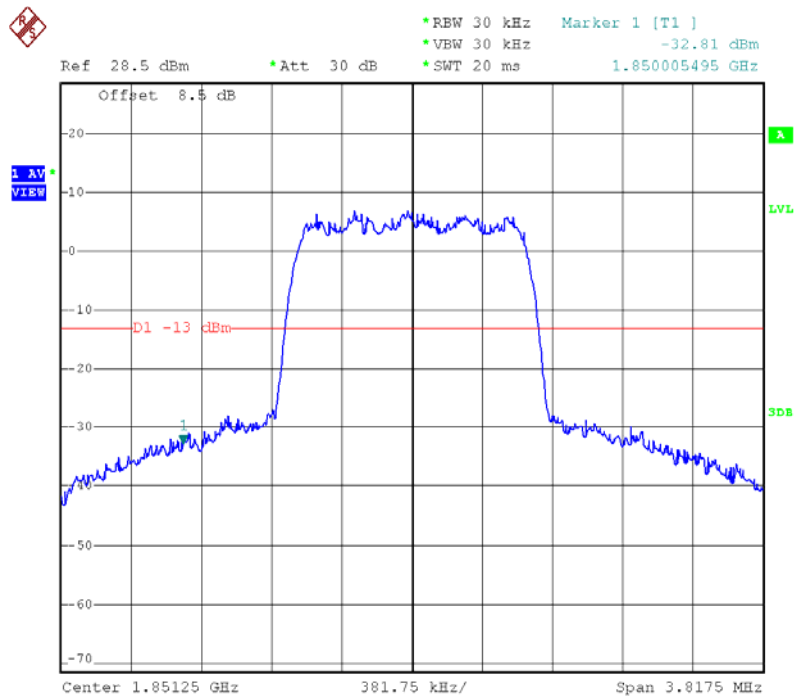


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